PATENT
Docket No.: **19226/2282 (R-5782)**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Swihart et al.	Examiner: A. Sarkar
Serial No.	:	10/796,442	
Cnfrm. No.	:	1817	Art Unit: 2891
Filed	:	March 9, 2004	
For	:	PROCESS FOR PREPARING LUMINESCENT SILICON NANOPARTICLES	

DECLARATION OF MARK T. SWIHART, Ph.D. UNDER 37 C.F.R. § 1.131

I, MARK T. SWIHART, Ph.D., hereby declare:

1. I received a Bachelor of Science degree in Chemical Engineering from Rice University in 1992 and a Ph.D. degree in Chemical Engineering from The University of Minnesota, Twin Cities in 1997.

2. I am currently Associate Professor and Director of Graduate Studies, Department of Chemical and Biological Engineering, at The University at Buffalo (SUNY).

3. I am an inventor of the above-identified application.

4. I have reviewed U.S. Patent No. 6,846,565 to Korgel et al. ("Korgel"), and am presenting this declaration to comment on column 8, lines 50–54 ("The capping agent may interact with an organometallic precursor during formation of the nanoparticle to assist in controlling the growth of the particle. The capping agent may bond covalently to the particle surface, or stick through weak interactions, such as hydrogen bonding.").

5. As used in this context, "hydrogen bonding" does not refer to bonds between silicon and hydrogen. It is meant in the traditional sense in which hydrogen bonding occurs in water. That is, when hydrogen is attached to a strongly electronegative atom (usually oxygen or nitrogen), it will strongly interact with other electronegative atoms. This would most likely occur in the context of silicon nanoparticles if there are -OH groups

on the particle surface that can interact with other -OH groups in solution (in water, alcohols, etc.). This is not related to what is happening during hydrosilylation of the silicon nanoparticles as carried out in the present invention. During hydrosilylation, a hydrocarbon (which cannot participate in hydrogen bonding) reacts with an Si-H bond (which also cannot participate in hydrogen bonding).

6. While the Korgel patent describes the use of alkenes (compounds with a double bond) as capping agents, among a long list of possible capping agents, it only describes their use *during* particle synthesis, and not their reaction with hydrogen-terminated particles *after* particle synthesis. In general, the long list of molecules Korgel provides as potential capping agents will not react with hydrogen terminated silicon nanoparticles. Only a small subset (alkenes, alkynes, perhaps some others) will do so. The Korgel patent does not give any description of the reactions believed to lead to the capping of particles by alkenes or alkynes during synthesis, let alone teach that such capping is carried out by hydrosilylation.

7. An alkene or alkyne capping agent would not participate in hydrogen bonding (because it does not contain electronegative atoms like O or N). Hydrogen atoms on a hydrogen-terminated silicon surface also would not participate in hydrogen bonding. Hydrogen atoms in -OH groups on an -OH terminated silicon surface would be expected to participate in hydrogen bonding, but that is not relevant to hydrosilylation, which will not occur on -OH terminated surfaces.

8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: June 24, 2006

Mark T. Swihart, Ph.D.